V.—McDONNELL: THE PHYSIOLOGY AND PATHOLOGY OF THE SPINAL CORD.

LECTURES ON THE SCIENCE AND PRACTICE OF SURGERY. PART II. THE PHYSIOLOGY AND PATHOLOGY OF THE SPINAL CORD. By Robert McDonnell, M. D., F. R. S., Dublin: Fannin & Co., 41 Grafton St. 1875. P. 137—320.

This little work comprises two essays and four lectures on various questions relating to the physiology and pathology o the spinal cord.

The first paper is entitled a "Critical Essay on the Physiology and Pathology of the Spinal Cord," and is chiefly occupied in a survey of the celebrated experiments on that part of the nervous system, by Dr. Brown-Sequard, who, it appears, was aided by Dr. McDonnell, in performing his experiments during the lectures and demonstrations of the former, in the city of Dublin. They were not only repeated by our author for purposes of verification, but their correctness was still further made manifest by microscopical examination of the spinal cords of the animals he had operated on during his public lectures, and which our author had taken the precaution to preserve. Dr. McDonnell adds the results of various experiments of his own, and of a study of the literature of the subject.

The principal portion of the first paper is devoted to a review of the main points in the progress of the anatomy and physiology of the spinal cord, arriving finally at the researches and discoveries of Dr. Brown-Sequard, in relation to the nervous system, a consideration of which under various relations, forms the bulk of the present volume. But it is to be presumed that the majority of our readers have already an independent acquaintance with the writings of that eminent physiologist, and it will be unnecessary, therefore, to follow our author closely in the present notice.

Although the work bears the date 1875, yet we have no means for knowing just when its matter was put in its present shape, but from the fact that a number of important points in relation to the anatomy and physiology of the spinal cord and vaso-motor nervous system, are not mentioned, as they should have been in a work of so late date, we judge it must have been prepared sometime ago.

In discussing the views of Schroeder Van der Kolk as to the functions of the gray matter of the spinal cord, Dr. McDonnell admits that not only do the sensory nerves convey impressions, but that they are "sensitive to pain." But this is surely an incorrect statement as it stands, however different the real view of the author. A sensory nerve is not "sensitive to pain," no matter where it is, or what the circumstance. Sensory nerves can only conduct sense impressions while the sensibility which reacts to painful or other impressions, is *always in a nerve center.*

In speaking of reflex nervous action (P. 181.), Dr. McDonnell. in common with other physiologists, ascribes to Prochaska (1801) the credit of clearly recognizing it. But how long shall it be that British physiologists, not to speak of others, will remain ignorant of, or ignore, the statements of Hartley on this subject, who wrote fully a half century before Prochaska. We have tried to do justice to Hartley's claims in the pages of this JOURNAL, (Vol. II. P. 398. 1875.) and to what we have there said would we direct the attention of our readers.

The view adopted by the author, as to the nervous mechanism for the contraction and dilation of the muscular vessels, is essentially the one we have developed sometime since, in various places, chiefly in the pages of this Journal, and with which our readers must be familiar.

There is one remark in regard to the vaso-motor nervous system, on which we feel something more should be said. Our author says "it originates chiefly from the cerebro-spinal axis." (P. 190.) This view and its opposite have been held and argued, for a long time, but we do not see what real proof there is, that the vaso-motor nervous system originates even chiefly from the cerebro-spinal axis. There is just as much proof that the brain originates from the cord, or the cord from the brain. It cannot be that the cord appears first in the order of development, for it is well known the peripheral vaso-motor system is developed before the cord. If this is so, how can the former originate from the latter? Then again it is plain from the structure and mode of arrangement of the peripheral vaso-motor nervous system, that though anatomically connected with, and in a measure under control of, the cord and medulla, it yet has a sphere of action of its own. The superior centers in the cord, can modify within certain limits, the action of the peripheral vaso-motor ganglia, but nothing more. This part of the nervous system is subordinate in rank, to the cord and medulla, but it does not originate from them. We are now in a position to answer this question definitely, and we do not think it has been answered quite in accordance with the facts, by Dr. McDonnell.

Our author concedes more credit to the observations and reasonings of Mr. Lister, than we had supposed him entitled to, and in an extract from a recent review of M. Vulpian's work on the vaso-motor nervous system, credit is given to Prof. Rutherford, in the same field, which has not been generally recognized.

At page 215, he quotes an experiment from the writings of Dr. Brown Sequard, which we think of value in a different relation than that in which it is placed by the author. It relates to "a rabbit, all the parts of one of whose hind limbs were amputated, except the nerves, and in which the toes are, after a time, about losing their sensibility, in consequence of all circulation of the blood being at an end in the limb. There is, nevertheless, rapid and very notable return of sensibility on dividing the posterior columns of the spinal cord in the dorsal region. It is obvious that this return of sensibility cannot be due to any cause connected with the vessels of the partially amputated limb; we must attribute it rather to the increased vascularity of the spinal cord, which must more or less extensively result from the injury done to it."

We have cited this experiment on account of the support it gives to that view of neuralgias, which places the chief seat of such disorders at the nervous centres, whatever may be the condition of the related nerve trunks. But this is not the ordinary view. Neuralgias are usually spoken of, often without qualification, as diseases of the *peripheral* nervous system, as "*peripheral* hyperesthesias," etc. If it were not so common to use such expressions, it would seem needless to say they are erroneous, strictly speaking.

The next paper is, on the one hand, an elaborate refutation of the hypothesis of Dr. Brown-Sequard, as to the existence of separate sensory nerve fibres for conducting different kinds of sense impressions, and, on the other, the development of a theory, in some sense Dr. McDonnell's own, which maintains, that a single nerve fibre may conduct various kinds of nerve impressions,—just as the same wire, for example, may conduct heat, and electricity, and sound, separately or at the same time. The most beautiful illustration of this theory, the Gray telephone, a contrivance for transmitting various messages and musical sounds simultaneously by one telegraphic wire, seems to have not been known to the author at the date of publication. We have no doubt, for our own part, that the theory of Dr. McDonnell is more nearly in accordance with facts than the one it was intended to supplant.

The remainder of the volume is occupied with lectures on "physiology applied to practice."

In the outset, Dr. McDonnell states and argues, with much force and clearness, the question as to the utility and humanitarian aspects of vivisection, and we know of no better presentation of the case within narrow limits.

The lectures are brief, and are chiefly devoted to the relations of the nervous, to the vascular system. In the first, is a description of the well known experiments of Bernard and others, on the effects of division of the cervical sympathetic, of galvanization of the same nerve, and the effects on cardiac action alternately, of division and electrical excitation of the vagi nerves, and those of Brown-Sequard and Tholozan on reflex vaso-motor action. But our readers are already so familiar with these subjects, as to render any mention of them as treated here, unnecessary.

The next lecture is devoted to giving an account of the action of the vaso-motor nerves on the small muscular vessels, a subject that has been treated at great length in our pages.

In explaining the enlargements and contractions of the blood vessels, under influences reaching them by way of their vaso-motor nerves, Dr. McDonnell is inclined to accept the fanciful, though ingenious notions of Dr. C. B. Radcliffe, as to the ultimate physics of muscular contraction, rather than the more reasonable one, as it seems to us to be, of the inhibitory, if not stimulating action of the intra-spinal vaso-motor apparatus on the small tonic peripheral ganglia, upon which the actions of the vessels depend, and through which alone, the more central portions of the vaso-motor system can modify the actions of the vessels.

The last two lectures are given to "a critical analysis of the recent investigations of physiologists, concerning the functions of the spinal cord, and medulla oblongata," truly a large subject, and very clearly, but too briefly treated. As regards the cord, the lecture consists of but little more than a brief critical and experimental discussion of Dr. Brown-Sequard's discoveries and opinions on this subject, and with which, as already said, our readers must be familiar.

We notice in passing, that at page 302, as well as elsewhere, the common mistake is made of confounding hyperesthesia, with hyperalgesia. In the cases mentioned, there is not so much if at all—increased sensibility to touch, as to painful impressions. Dr. McDonnell adopts the hypothesis of Dr. Brown-Sequard, as to the nature of the phenomena of the so-called "recurrent sensibility;" viz. that it depends on the contraction of muscles, to which the divided nerves lead. But there is really no proof, that the pain which an animal gives signs of when the peripheral end of a divided motor nerve root is irritated, depends on contraction of the related muscles, than there is of the existence of recurrent sensory fibres. The phenomenon is due to the simple presence of sensory nerve fibers distributed *to* the peripheral portion of the motor root, (the nervi nervorum) as in other parts of the body. They can be traced through the corresponding sensory root to the cord, the same as sensory fibres can be from other parts of the body. The reason why the central portion of the motor root is not sensitive, is because the sensitive *nervi nervorum*, have been divided. We have never been able to see why this subject should have been deemed peculiar.

The volume closes with brief accounts of epilepsy, artificial and accidental, and labyrinthine vertigo.

The treatment of the whole subject, as actually rendered, is exceedingly meagre, when measured against the comprehensiveness of the title,—"*the physiology and pathology of the spinal cord.*" But such parts of the theme as do receive consideration, are discussed with unusual directness and transparency. The style, and reasoning of the work, are highly pleasing and simple, so much so, that it is read with more than ordinary pleasure.

SHORTER NOTICES.

I. A PRACTICAL TREATISE ON DISEASES OF THE EYE. By Robert Brudenell Carter, F. R. C. S., Ophthalmic surgeon to St. George's Hospital, etc., etc. Edited with additions and test-types, by John Green, M. D. Philadelphia: 1876. Henry C. Lea. 515 pages. Chicago: Jansen, McClurg & Co.

II. A TREATISE ON THE SCIENCE AND PRACTICE OF MIDWIFERY. By W. S. Playfair, M. D., F. R. C. P., Professor of Obstetric Medicine in King's College, etc. Philadelphia: 1876. Henry C. Lea. 576 pages. Chicago: Jansen, McClurg & Co.

III. A PRACTICAL TREATISE ON THE DISEASES, INJURIES AND MALFORMATIONS OF THE URINARY BLADDER, THE PROSTRATE GLAND, AND THE URETHRA. By Samuel Gross, M. D., L. L. D., etc. Third edition. Revised and edited by Samuel W. Gross, A. M., M. D. Illustrated by one hundred and seventy engravings. Philadelphia: 1876. Henry C. Lea. 574 pages. Chicago: W. B. Keen, Cooke & Co.

IV. AN INTRODUCTION TO PATHOLOGY AND MORBID ANATOMY. By T. Henry Green, M. D., Lond. Second American, from the third, revised and enlarged English edition. Illustrated by one hundred and eleven engraving on wood. Philadelphia: 1876. Henry C. Lea. 316 pages. Chicago: W. B. Keen, Cooke & Co.

V. COMPENDIUM OF HISTOLOGY: TWENTY-FOUR LECTURES. By Heinrich Frey, Professor. Translated from the German by permission of the author, by George R. Cutter, M. D. Illustrated by 208 engravings on wood. New York: 1876. G. P. Putnam's Sons. 274 pages. Chicago: Jansen, McClurg & Co.